

ADHESION AND/OR ENCAPSULATION OF SILICON CARBIDE-BASED SEMICONDUCTOR DEVICES ON CERAMIC SUBSTRATES

ABSTRACT OF THE DISCLOSURE

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A SiC die with Os and/or W/WC/TiC contacts and metal conductors is encapsulated either alone or on a ceramic substrate using a borosilicate (BSG) glass that is formed at a temperature well below upper device operating temperature limits but serves as a stable protective layer above the operating temperature (over 1000°C, preferably >1200°C). The glass is preferably 30-50% B₂O₃/70-50% SiO₂, formed by reacting a mixed powder, slurry or paste of the components at 460°-1000°C preferably about 700°C. The die can be mounted on the ceramic substrate using the BSG as an adhesive. Metal conductors on the ceramic substrate are also protected by the BSG. The preferred ceramic substrate is AlN but SiC/AlN or Al₂O₃ can be used.

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